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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/614,502	07/07/2003	Larry F. Rhodes	203PR07071-US-CIP2	9266

7590 06/20/2005

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EXAMINER	
ZALUKAEVA, TATYANA	
ART UNIT	**PAPER NUMBER**
1713	

DATE MAILED: 06/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/614,502	RHODES ET AL.	
	Examiner	Art Unit	
	Tatyana Zalukaeva	1713	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 April 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Applicants amended claims 1 and 13 to clarify the substitution sites on the norbornene ring.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 6 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 04063810A.

Disclosed is a photoimagable composition comprising an acrylate norbornene polymer comprising units of 4, 5 substituted norbornene (see claim 2 of translation) in the amount of 30-90 mol. % (second paragraph of page 8 of translation) and an acrylate monomer represented by formula (I) in claim 8 of translation in the amount as instantly claimed. This reads on the instant claims 1 and 6.

The norbornene compound of formula (II) is the compound of the instant claim 2.

5. Claims 3, 8-9, 12-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaimoto et al (U.S. 5,585,219) in view of JP'810.

Kaimoto discloses resist composition and a process for forming a resist pattern using a resist composition. The composition includes 100 parts by weight of a copolymer of a 2-norbornene-2-substituent unit and an acrylic acid ester unit of the

formula below wherein, X is a cyano or chloro group, R is tert-butyl, dimethylbenzyl, or tetrahydropyranyl, m is an integer of 9 to 2390, and n is an integer of 21 to 5180, and 1 to 20 pads by weight of a photo acid generator (PAG). A finely- resolved resist pattern with high sensitivity and good dry etch resistance is obtained by the present composition and present process for forming the resist pattern (see abstract). Synthetic Example 1 (Synthesis of copolymer of 2-norbornene-2-carbonitrile and methacrylic acid tetrahydropyranyl ester) 5.0 g (41.6 m mol) of z-norbornene-z-carbonitrile, 4.72 g (27.7 m mole) of methacrylic acid tetrahydropyranyl ester and 13.9 ml of tetrahydrofuran (fully dried) (in THF) were charged into 100 ml of the three-necked flask equipped with a magnetic stirring bar coated with a fluorine polymer (Teflon, which is a registered mark), followed by stirring at -l7.degree. C. for ten minutes under a nitrogen atmosphere. To this solution, 31 1 mg (2.8 m mol, 4 mol %) of potassium tert-butoxide was dissolvéd and 4 ml of dry THF was slowly added. This example provides for the ratio of norbornene unint to methacrylate unit as per claim 1. See also synthetic example 2 in col. 6 and 7. The photoresist composition is described in Example 1 , col.7, lines 50-55 and comprises above described copolymer having acid liable groups, PAG and solvent, the method of its forming is also described in this example, as well as in examples 2 and 3 in col.8

With regard to the method of forming patterned structure, see Examples 1 , col.7, lines 60-65, col.8, lines 1-15, 29-40, and general description in col.2, lines 20-67. Limitations of claims 13, 14, 16. The resist coatings of Kaimoto were subjected to dry etching by CF4/O2. The disclosure of Kaimoto differs from the instant claims by using 2-substituted

norbornene instead of 4- or 5-substituted norbornene as instantly claimed. However, based on their structural similarity one skilled in the art would have found obvious to expect similar properties from, and thus will found obvious to use JP'810 4,5-substituted norbornene in Kaimoto with the reasonable expectation of success.

6. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP'810 in view of Kaimoto and further in view of Sen et al (U.S. 6,111,041) . The steps and the components of the process of claims 8 and 9 are met by JP'810 and Kaimoto, as discussed above. Kaimoto does not teach the preparation of polymer using Pd catalyst. Sen discloses production of norbornene-acrylate copolymers using Pd catalyst, wherein the comonomers are identical to those of Kaimoto, and the motivation is made to utilize the type of catalyst that realizes the advantages of both types of monomers, i.e. acrylates and norbornenes. Therefore, based on the substantial identity of both polymerization systems of Kaimoto and Sen it would have been obvious to those skilled in the art at the time the invention was made to utilize known catalytic system for known polymers in order to vary and optimize the ratios of acrylate/norbornene in resulting polymers and thus to arrive at the instant claims 10 and 11 .

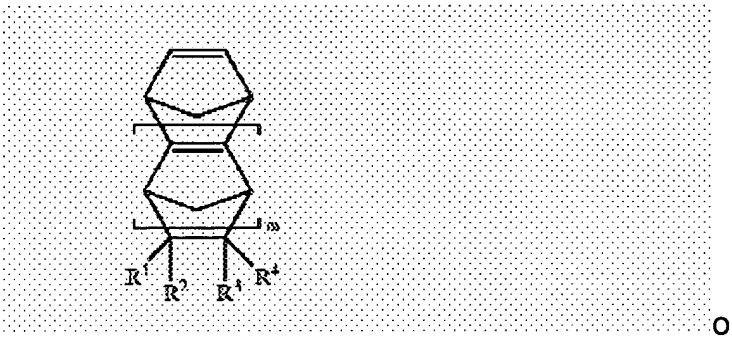
7. Claims 4-7, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP'810 in view of Kaimoto and further in view of Rhodes et al (U.S. 6,232,417).

With regard to claim 4 JP'810 and Kaimoto do not disclose the presence of one of dissolution rate modifier, quencher or sensitizer. Photoresist compositions of Kaimoto

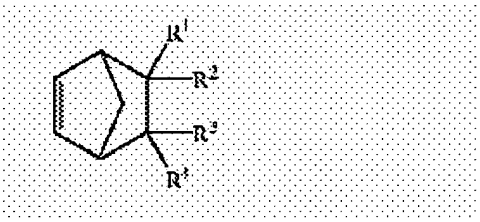
and Rhodes contain the same basic units of norbornene and norbornene derivatives as monomers, and thus utilize the advantages of norrbornenes, such as good dry etch resistance and at the same time having good transparency. The photoresist compositions of Rhodes invention contain a sensitizer capable of sensitizing the photoacid initiator to longer wave lengths ranging from mid UV to visible light. Depending on the intended

application, such sensitizers include polycyclic aromatics such as pyrene and perlene. Rhodes further emphasizes that the sensitization of photoacid initiators is well-known and is described in numerous patents. It would have been obvious to those skilled in the art to utilize the sensitizer, as suggested by Rhodes in the composition of Kaimoto in order to sensitize the photoacid initiator to longer wave lengths ranging from mid UV to visible light.

With regard to claims 5-7 and 12, the disclosure of JP'810 and Kaimoto differs from the instant claims by not disclosing the use of more than one of either monomer: norbornene or acrylate. Rhodes discloses a photoresist composition comprising a photoresist copolymer photoacid generator and organic solvent. Imageable radiation-sensitive resist composition is disclosed comprising an acid-generating initiator and a polycyclic polymer containing recurring acid labile pendant groups along the polymer backbone. Preferred monomers are shown in col.5, lines 45-50



or in col.8, lines 30-40



The photoresist compositions of Rhodes incorporate MORE than one norbornene derivative as a comonomer, as seen from numerous examples, such as 27-32, col.63, 64, etc., 41, 42 in col. 67.Based on the similarity of photoresist compositions of Rhodes and Kaimioto, it would have been obvious to employ more than one norbornene derivative as a monomer unit in order to achieve better balance between the dry etch resistance, UV light absorbance and transparency and thus to arrive at the instantly claimed subject matter.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tatyana Zalukaeva whose telephone number is (571) 272-1115. The examiner can normally be reached on 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on (571) 272-1305. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tatyana Zalukaeva
Primary Examiner
Art Unit 1713

June 14, 2005